PAT-NO: JP406083296A
DOCUMENT-IDENTIFIER: JP 06083296 A
TITLE: ON-VEHICLE VIDEO DISPLAY DEVICE

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INVENTOR-INFORMATION:

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INT-CL (IPC): G09G005/00 , G09G003/00 , G09G003/36 , G09G005/34

US-CL-CURRENT: 345/214

ABSTRACT:

PURPOSE: To make easy to watch video even in traveling vehicles by detecting displacement in a video display means accompanied with vibration of vehicle and moving a video display position on the video display means in the direction of canceling the detected displacement.

CONSTITUTION: Acceleration generated in a display system owing to traveling vibration of vehicle in the vertical direction is detected by an acceleration sensor 20, and a component in the region of the number of intrinsic vibration of the display system is taken out from a band pass filter BPF 22. This number of intrinsic vibration is generally much lower than frame frequency of a video signal. Therefore, a displacement quantity calculating section 24 regards sampling acceleration as average acceleration, and displacement quantity compared at the time of the last frame is found with a unit of raster every one frame. And a controller 32 displays video which is moved in the direction of canceling vertical vibration displacement generated in the display on an LCD color matrix display device 26 based on this displacement quantity. Blurring of display video can be removed by repeating this operation, and visibility of a driver is improved.

## DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention relates to the graphic display device for mount with which the graphic display device for mount is started, especially a display is supported by the vehicle interior of a room in the shape of a cantilever.
[0002]
[Description of the Prior Art]In recent years, development and utilization of the graphic display device for vehicles loading are progressing, TV image and a video software image are projected, and it is spreading widely in order to enrich a car life, or to project a navigation image and to carry out facilitating of the drive on a request background. Evacuate and store a display in the dashboard of vehicles, make it not become a crew member's obstacle at the time of non-use, one of the graphic display devices for mount is made to advance to the dashboard empty vehicle interior of a room at the time of use, and there is a thing of the storage type whose viewing of an image the crew member enabled.
[0003]An example of the conventional graphic display device for storage type mount is shown in drawing 5. The graphic display device 10 for mount is provided with the display 18 attached so that rotation of standing up and inversion might be attained at the tip part of the case 14 provided in the dashboard 12, the slide body 16 accommodated in this case 14 enabling a free attitude, and this slide body. And the slide body 16 is made to evacuate and store in a case with the sliding mechanism which was changed into the state where the display 18 was horizontally inverted according to the moving mechanism provided in the tip part of the slide body 16, and was formed in the case 14 at the time of non-use. On the contrary, at the time of use, the slide body 16 is made to advance to the dashboard 12 empty-vehicle interior of a room with the sliding mechanism formed in the case 14, and the display 18 is raised according to the moving mechanism provided in the tip part of the slide body 16.
[0004]
[Problem(s) to be Solved by the Invention]However, in the above-mentioned conventional graphic display device for mount, since the display 18 was supported in the state of a cantilever at the time of use, the display 18 vibrated up and down by the running vibrations of vehicles, and there was a problem of the image projected on the display 18 having blurred up and down, and being hard coming to see. As mentioned above, the purpose of this invention is to provide the graphic display device for mount an image is not hard coming to see also in a run of vehicles.
[0005]

[Means for Solving the Problem]In a graphic display device for mount with which an image displaying means is supported by the vehicle interior of a room in the shape of a cantilever in this invention as for an aforementioned problem, It is attained by having had a detection means to detect displacement of an image displaying means accompanying vehicle vibration, and a graphic display impaction efficiency means to move a graphic display position on an image displaying means in the direction which negates displacement detected by this detection means.

[0006]

[Function]According to this invention, the graphic display position on an image displaying means is moved in the direction which detects displacement of the image displaying means accompanying vehicle vibration, and negates the this detected displacement. Even if running vibrations are added and vibration arises in an image displaying means by this, blur of a display picture is lost, it takes to a crew member, and the visibility of an image improves.

[0007]

[Example]It is an outline view showing the condition of use of the graphic display device for mount which drawing 1 starts the display circuit lineblock diagram of the graphic display device for mount, and requires drawing 2 for the example of this invention. 10A is a graphic display device for mount among drawing 2, and the cases 14 and 16 which 14 provided in the dashboard 12 are the slide body accommodated in this case 14 enabling a free attitude, and the display attached so that the rotation of standing up and inversion of 18 might be attained at the tip part of this slide body. At this example, the display 18 shall perform graphic display by non-interlace scan. At the time of non-use, the slide body 16 is evacuated and stored in a case by the sliding mechanism which changed into the state where the display 18 inverted horizontally according to the moving mechanism provided in the tip part of the slide body 16, and was formed in the case 14. On the contrary, at the time of use, it advances to the slide body 16 with the sliding mechanism formed in the case 14 in the dashboard 12 empty-vehicle interior of a room, and the display 18 stands up according to the moving mechanism provided in the tip part of the slide body 16 (real line voice).

[0008]20 is the acceleration sensor with which the display 18 was equipped, and detects the acceleration of sliding direction vibration of the display 18 produced in the running vibrations of vehicles. 22 is a band-pass filter (BPF) and takes out the slide body 16 and the ingredient near the character frequency of the system of the display 18 among the acceleration signals which the acceleration sensor detected. While 24 is the amount calculation part of displacement and sampling by the sampling pulse which inputted the acceleration signal inputted via BPF22 from the controller mentioned later, Predetermined calculation is performed promptly, the amount of displacement in comparison with the time of the last frame is calculated by a raster unit for every frame, and displacement data is outputted to a controller.

[0009]As for 26, a LCD color matrix display for indication and 28 perform the drive with as horizontal X drive circuit and 30 as a perpendicular direction [ respectively as opposed to / are Y drive circuit and / a LCD color matrix display for indication ]. 32 is a controller which creates the control signal which controls X drive circuit and Y drive circuit from the composite synchronizing signal in a video signal. This controller 32 outputs a sampling pulse to the amount calculation part 24 of displacement at the time, before a few [ the end of one frame ]. According to R, G, and B, one by one, control of the Y drive circuit 30 by the controller 32 is made by carrying out the abnormal-conditions drive of the direction of Y of the LCD color matrix display for indication 26 with the video signal made to this hold while it makes one line hold.

[0010]On the other hand, control of the X drive circuit 28 by the controller 32 is made by specifying a scan start position for every frame, and making the direction of X of the LCD color matrix display for indication 26 drive one by one from the this specified scan start position. Since the scan start position of the direction of X changes for every frame, the dot number of the direction of X of the LCD color matrix display for indication 26 is more than usual.
The number of drive wires of the X drive circuit 28 has also increased.
The controller 32 is based on the displacement data in the raster unit inputted from the amount calculation part 24 of displacement just before the following frame start, subtracts the amount of displacement from the scan start position specified as X drive circuit at the time of the last frame start, and specifies the scan start position at the time of a next frame start. The image which moved in the direction which negates by this the vibration displacement of the sliding direction produced on the display 18 can be made to project on the LCD color matrix display for indication 26.
[0011]The explanatory view and drawing 4 which drawing 3 shows operation of the amount calculation part 24 of displacement and the controller 32 are an explanatory view of a display picture, and are explained according to the figures of these below. Now, supposing the system of the slide body 16 and the display 18 vibrates to sine wave shape to a sliding direction centering on the return position 0 near character frequency $f_0$ in connection with running vibrations and this oscillatory wave form is x, the acceleration signal outputted from BPF22 will serve as the waveform a which differentiated x twice. Generally character frequency $f_0$ of the system of the slide body 16 and the display 18 is smaller for whether your being Haruka than the frame frequency (= 30Hz/s) of a video signal. Therefore, it can be considered that acceleration $a_1$ sampled before [ in the amount calculation part 24 of displacement ] the 1st-frame end by a sampling pulse is the average acceleration of the 1st frame term throughout, It can be considered that acceleration $a_2$ sampled before the 2nd-frame end is the average acceleration of the 2nd frame term throughout, and it is the same about the 3rd frame or subsequent ones.
[0012]When a frame period is set to T (= 1/30 s), change part $deltax_1$ of the amount of displacement added in the 1st frame period is $deltax_1=a_1T^2/2$ (1) to the amount of displacement up to the 0th frame.
the change part n of the amount of displacement seen by the raster unit when the raster pitch (scanning line interval) of the next door and the LCD color matrix display for indication 26 was set to p -- $n=a_1T^2/2p$ (book) (2)
A next door and the amount calculation part 24 of displacement make the integral value which rounded off below the a small number of point of the change part n for which it asked by (2) formulas displacement data n', and output it to the controller 32. The output of this displacement data will be made by the time the 1st frame period expires.
[0013]The controller 32 which inputted displacement data n', It is at the following 2nd-frame start time, and when specifying a scan start position as the X drive circuit 28, supposing the scan start position which it is at the 1st-frame start time, and was specified is $x_0$, $x_0$ calculated as $x_0-n'->x_0$ will be specified last time. As a result, the image of the 2nd frame will be displayed on the position which negates mostly change part $deltax_1$ of the amount of displacement shown by (1) compared with the 1st frame. n' indicates the image of the 1st frame in -3 (when the display 18 is displaced by three rasters below throughout [ 1st frame term ]), and the image of the 2nd frame to be (a)

of drawing 4 to (b).
[0014]Then, change part $deltax_2$ of the amount of displacement added in the 2nd frame period is $deltax_2=a_2T^2/2$ (3) to the amount of displacement up to the 1st frame. the change part n of the amount of displacement seen by the next door and the raster unit -- $n=a_2T^2/2p$ (book) (4)
A next door and the amount calculation part 24 of displacement make the integral value which rounded off below the a small number of point of the change part n for which it asked by (4) formulas displacement data n', and output it to the controller 32. The output of this displacement data will be made by the time the 2nd frame period expires.
[0015]The controller 32 which inputted displacement data n', It is at the following 3rd-frame start time, and when specifying a scan start position as the X drive circuit 28, new $x_0$ calculated as $x_0-n'->x_0$ is specified last time using scan start position $x_0$ which it is at the 2nd-frame start time, and was specified. As a result, the image of the 3rd frame will be displayed on the position which negates mostly change part $deltax_2$ of the amount of displacement shown by (3) compared with the 2nd frame.
[0016]The image which completely repeats the same operation about the 3rd frame or subsequent ones hereafter, and is displayed on the LCD color matrix display for indication 26 as a result, Since it is moved in the direction which always negates the vibration displacement of the sliding direction produced on the display 18, blur of a display picture will be lost, it will take to a crew member, and the visibility of an image will improve.
[0017]In the above-mentioned example, although BPF was provided in the output side of the acceleration sensor, it is not necessary to necessarily provide. Although the amount of displacement was calculated only from the output of the acceleration sensor 20 installed in the display 18, An acceleration sensor is formed also in the case 14 and it may be made to calculate the amount of displacement based on the signal which subtracted the output of the acceleration sensor formed in the case 14 from the output of the acceleration sensor installed in the display 18. Thereby, except for the ingredient by the vibration displacement of the vehicles itself, DIPUREI 18 can respond only to the ingredient displaced relatively to vehicles among the vibration displacement produced on the display 18. Although it was made to correspond to vibration of the sliding direction produced on the display 18, it may be made to correspond also to vibration produced in a longitudinal direction. The acceleration sensor which detects the acceleration of a longitudinal direction on the display 18 is specifically installed, the amount of displacement of a longitudinal direction is calculated from the output of this sensor, and the position held by one line in Y drive circuit is moved in the direction which negates this amount of displacement. Even if video signals are a thing of an interlace, and a composite signal, they are applicable similarly. It is applicable not only to a LCD type display but the display of other forms, such as a CRT type display.
[0018]As mentioned above, although an example, a modification, etc. explained this invention, according to the main point of this invention indicated to the claim, various modification is possible for this invention, and this invention does not eliminate these.
[0019]
[Effect of the Invention]A detection means to detect displacement of the image displaying means accompanying vehicle vibration above according to this invention, It has a graphic display impaction efficiency means to move the graphic display position on an image displaying means in the direction which negates the displacement detected by

this detection means, Displacement of the image displaying means accompanying vehicle vibration is detected, since it constituted so that the graphic display position on an image displaying means might be moved in the direction which negates the displacement which this detected, even if running vibrations are added and vibration arises in an image displaying means, blur of a display picture is lost, it takes to a crew member, and the visibility of an image improves.

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